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N. B. S.

Dr. C.M. Tchen investigated the problem of the kinetic theory of
turbulence in a rarefied plasma. A manuscript was completed. The
paper, entitled "Turbulence in a Rarefied Plasma", by C.M. Tchen,
was presented at the Symposium for Advanced Problems in Fluid
Mechanics, September 1965, Jurata, Poland.

It is now well known that turbulence is very frequently present in
gases in space: solar wind, solar corona, interplanetary and inter-
stellar space. Turbulence is also attributed as a mechanism of
dissipation necessary for the explanation of collision free shock
waves. The understanding of the gases in this turbulent state is
therefore important to space research.

A real plasma is rarely quiescent, as a rule oscillations and noises
arise in the plasma. In the early stage of their growth, the oscilla-
tions can be assumed of infinitesimal amplitude, and the approxima-
tion of linearization is valid. However, they become very soon of
finite amplitude, and the interaction between the various modes of
oscillations cannot be neglected. The nonlinear kinetic theory for
such plasma oscillations is difficult, and becomes now a topic of
great interest in plasma physics. The nonlinear behavior can be
exhibited by a quasi-linear approximation. However, this treatment
has a narrow field of applications, since it deals with the weak
interaction between a small number of modes. Therefore it is desir-
able to have a systematic method describing strong turbulence. The
strong interest in this country is in the many Russian publications in
turbulence, and in the recent book "Plasma Turbulence" by B.B. Kadomtsev,
which illustrates the importance of the problem in space fluid dynamics.

In this connection, Tchen has attempted to derive the nonlinear
Landau damping in a turbulent plasma, and the dispersion relation
between the various modes of oscillations. The kinetic equation in the
form of the Vlasov equation (collision free Boltzmann equation) was
used.